

1. Bangladesh Bank

DECO-16, Officer-15, AD FF-15

2. Janata Bank Ltd

IT AEO-16, Financial Analyst 15, AEO-15, AEO cash-15

3. Rajshahi Krishi Unnayan Bank

Officer-16, SO-16

4. Pubali bank

SO/O-16, JO Cash-16

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6. National Bank

PO-15

7. Standard Bank

TAO-16, TAO Cash-16, MTO-16

8. Midland Bank

TO-15, MTO-15

9. Bank Asia

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10. Bangladesh Shomobay Bank

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11. NRB Bank

MTO-16

12. South East Bank

TO-16, PO-16

13. House Building Finance Corporation

SO-15

14. Modhumoti bank

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15. Jibon Bima

AM-15

16. Meghna Bank

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17. Dhaka Bank

TCO-16

মানুষ মাত্রই ভুল। এই ফাইলটি আশা করি কোন ভুল নাই। তারপরও কোন ভুল থাকলে
আমাকে(Jafar Iqbal Ansary) জানাবেন।

ফাইলটি verify করতে সাহায্য করেছেন:

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1. Bangladesh Bank

1. 10% of the voters did not cast their vote in an election between two candidates 10% of the votes polled were found invalid the successful candidate got 54% of the valid votes and won by a majority of 1620 votes the number of voters enrolled on the voters list was (DECO 16)

Solution:

Let, the number of enrolled votes be x

Total polled voter = 90% of $x = 0.9x$

Total valid polled vote = 90 % of $0.9x = 0.81x$

According to the question,

$(54-46)\%$ of $0.81x = 1620$

Or, 8% of $0.81x = 1620$

Or, $0.08 \times 0.81x = 1620$

$\therefore x = 25,000$

Therefore, number of enrolled votes are 25000. (Ans.)

2. Two friends P and Q started a business investing in the ratio of 5:6. R joined them after 6 months investing an amount equal to that of Q. At the end of the year, 20% profit was earned which was equal to Tk. 98000. What was the amount invested by R? (DECO 16)

Solution:

Let, the total investment be Tk. x .

According to the question,

20% of $x = 98000$

Or, $0.2x = 98,000$

Or, $x = 98,000/0.2$

$\therefore x = 490000$.

Let the capitals of P, Q and R be Tk. $5x$, Tk. $6x$ and Tk. $6x$ respectively.

Now,

$5x + 6x + 6x \times \frac{1}{2} = 490000$

Or, $14x = 490000$

$\therefore x = 35000$.

\therefore R's investment = $6x = \text{Tk. } (6 \times 35000)$
= Tk. 210000. (Ans.)

ব্যাখ্যা: R বছরের অর্ধেক সময় invest করেছিল তাই $(6x \times \frac{1}{2})$ হবে।

03. A shop stocks four types of caps, there are $\frac{1}{3}$ as many red caps as blue caps and $\frac{1}{2}$ as many green caps as red caps. There are equal number of green caps and yellow caps. If there are 42 blue caps, then what percent of the total caps in the shop are blue? (Officer 15)

Solution:

Given that, blue caps = 42

Red caps = $42/3 = 14$

Green caps = $14/2 = 7$

Yellow caps = 7

Total caps = $42 + 14 + 7 + 7 = 70$

Percentage of blue caps = $(42/70) \times 100 = 60\%$

Ans: 60%

Alternative Method:

Let, blue caps = x ,

red caps = $x/3$,

green caps = $(1/2) \times (x/3) = x/6$,

yellow caps = $x/6$

Given that, $x = 42$ which is blue caps

So, red = $42/3 = 14$,

green = yellow = $42/6 = 7$

\therefore Total caps = $42 + 14 + 7 + 7 = 70$

In 70 caps, blue caps 42

\therefore In 1 cap, blue caps $42/70$

\therefore In 100 caps, blue caps $(42/70) \times 100$
= 60

Ans: 60%

04. The annual incomes and expenditures of a man and his wife are in the ratios 5:3 and 3:1, respectively. If they decide to save equally and find a balance of Tk. 4000 at the end of the year, what was their income? (Officer 15)

Solution:

Let, their income be $5x$ and $3x$ and their expenditure be $3x$ and x .

According to the question,

$$(5x+3x) - (3x + x)=4000$$

$$\text{Or, } 4x=4000$$

$$\therefore x=1000$$

So, Man's income $5x=5 \times 1000=\text{Tk. } 5000$

and woman's income $3x=3 \times 1000=\text{Tk. } 3000$

Ans: Tk. 5000 and Tk. 3000.

Alternative Method:

Let,

Man's Income be $5x$ and expenditure be $3x$

Again, Woman's Income be $3x$ and expenditure be x

So, Savings of Man $=5x-3x = 2x$ and Savings of Woman $=3x-x = 2x$

According to the question,

$$2x+2x=4000$$

$$\text{Or, } 4x=4000$$

$$\therefore x = 1000.$$

So, income of Man $= 5 \times 1000 = 5000$

and income of Woman $= 3 \times 1000 = 3000$.

Ans: Tk. 5000 and Tk. 3000.

05. A person sold two articles. Each for the same price of Tk. 1040. He incurs 20% loss on the first and 10% loss on the second. Find his overall percentage of loss. (Officer 15)

Solution:

Let, Price be Tk. 100

At, 20% loss, selling price $=100-20=\text{Tk. } 80$

and at 10% loss selling price $=100-10=\text{Tk. } 90$

So, cost of 1st item $= (1040/80) \times 100=\text{Tk. } 1300$

and cost of 2nd item $= (1040/90) \times 100=\text{Tk. } 1155.55$

Total cost of two items $=\text{Tk. } (1300+1155.55)$

$$= \text{Tk. } 2455.55$$

But selling price $=1040+1040=\text{Tk. } 2080$.

So, loss $=\text{Tk. } (2455.55 - 2080)$

$$= \text{Tk. } 375.55$$

$$\therefore \text{Overall loss percentage} = (375.55/2455.55) \times 100 \% \\ = 15.29\%$$

Ans: 15.29%

06. If the sum of five consecutive integers is S, what is the largest of those integers in terms of S? (Officer 15)

Solution:

Let, consecutive integers are $x, x+1, x+2, x+3, x+4$.

According to the question,

$$x+x+1+x+2+x+3+x+4=s.$$

$$\text{Or, } 5x+10=s$$

$$\text{Or, } x=(s-10)/5$$

$$\text{Or, } x+4=(s-10)/5 +4. \text{ [Add 4 both side]}$$

$$\text{Or, } x+4=(s+10)/5.$$

$$\therefore x+4= s/5+2$$

$$\therefore \text{The largest integer} = s/5+2$$

Ans: $s/5+2$

07. The difference between two numbers is five and the difference of their squares is 65. What is the larger number? (Officer 15)

Solution:

Let, Larger number be x and smaller number be y

According to the question,

$$x - y = 5 \dots\dots\dots(i)$$

$$\text{and, } x^2 - y^2 = 65 \dots\dots\dots(ii)$$

$$\text{Or, } (x+y)(x-y) = 65$$

$$\text{Or, } (x+y) \times 5 = 65$$

$$\therefore x+y = 13 \dots\dots\dots(iii)$$

From, (i)+(ii) we get,

$$2x = 18$$

$$\therefore x = 9$$

Putting the value of x in (i)

we get,

$$9 - y = 5$$

$$\therefore y = 4$$

$$\therefore \text{Larger number} = 9$$

Ans: 9.

Alternative Method:

Let, the smaller number = x and larger number = $x+5$

According to the question,

$$(x+5)^2 - x^2 = 65$$

$$\text{Or, } x^2 + 10x + 25 - x^2 = 65$$

$$\text{Or, } 10x = 65 - 25$$

$$\text{Or, } 10x = 40$$

$$\therefore x = 40/10 = 4$$

$$\therefore \text{Larger number} = 4 + 5 = 9$$

Ans: 9.

08. Robi drove 100 miles to visit a friend. If he had driven 8 miles per hour faster than he did, he would have arrived in 5/6 of the time, he actually took. How many minutes did the trip take? (Officer 15)

Solution:

Let, Robi took x hours to cover 100 miles

Actual speed = $100/x$ mph [mph = Mile per hour]

New speed = $(100/x + 8)$ mph

New time taken = $x \times (5/6) = 5x/6$ hours.

We know,

Speed \times Time = Distance

$$(100/x + 8) \times (5x/6) = 100$$

$$\therefore x = 5/2$$

$$\text{Ans: } 5/2 \text{ hours} = 150 \text{ min.}$$

09. Of the three numbers, second is twice the first and is also thrice the third. If the average of the three numbers is 44, then what will be the largest number? (Officer 15)

Solution:

Let, 1st Number = x , 2nd Number = $2x$ and 3rd Number = $2x/3$

According to the question,

$$x + 2x + 2x/3 = 44 \times 3$$

$$\text{Or, } (3x + 6x + 2x)/3 = 132$$

$$\text{Or, } 11x = 396$$

$$\therefore x = 36.$$

So, the largest number is = $2 \times 36 = 72$.

Ans: 72.

10. The percentage profit earned by selling an article for Tk 1920 is equal to the percentage loss incurred by selling the same article for Tk 1280. At what price should the article be sold to make 25% profit. (AD FF 15)

Solution:

Let, amount of profit be x and loss be x

According to the question,

$$1920 - x = x - 1280$$

$$\text{Or, } 2x = 3200$$

$$\text{Or, } x = 3200/2$$

$$\therefore x = 1600$$

$$\therefore \text{At 25\% profit, new selling price} = 1600 + 25\% \text{ of } 1600 = 2000 \text{ Tk}$$

Ans: 2000Tk.

Alternative Method:

Let, profit and loss = $x\%$.

$$\frac{1920}{(100 + x)} = \frac{1280}{(100 - x)}$$

$$\text{Or, } 128,000 + 1280x = 192,000 - 1920x$$

$$\text{Or, } 1280x + 1920x = 192,000 - 128,000$$

$$\text{Or, } 3200x = 64,000$$

$$\therefore x = 20$$

$$\text{Cost price} = \text{Tk } 1920 / (100 + 20)$$

$$= \text{Tk } 1600$$

$$\therefore \text{At 25\% profit, Selling Price} = \text{Tk. } 1600 + 25\% \text{ of } 1600 \\ = \text{Tk. } 2000$$

Ans: 2000Tk.

11. A can do a work in 10 days, while B alone can do it in 15 days. They work together for 5 days and rest of the work is done by C in 2 days. If they get Tk 4500 for whole work, how should they divide money? (AD FF 15)

Solution:

A does in 1 day = $1/10$ portion,

So, in 5 days = $1/2$ portion

Similarly, B does in 1 day = $1/15$ portion

\therefore B does in 5 days = $1/3$ portion

In 5 days (A+B) work = $1/2 + 1/3 = 5/6$ portion

So, in 2 days C does work = $1 - 5/6 = 1/6$ portion

Now,

$$\text{Share of A} = 4500 \times (1/2) = 2250 \text{ Tk}$$

$$\text{Share of B} = 4500 \times (1/3) = 1500 \text{ Tk}$$

$$\text{Share of C} = 4500 \times (1/6) = 750 \text{ Tk (Ans)}$$

12. The average age of students of a class is 15.8 years. The average age of boys in the class is 16.4 years and of the girls is 15.4 years. Find the ratio of number of boys to the number of girls in the class. (AD FF 15)

Solution:

Let, the number of boys be ' x ' and girls be ' y '.

$$\therefore \text{Total students} = x + y$$

According to the question,

$$16.4x + 15.4y = 15.8(x + y)$$

$$\text{Or, } 16.4x + 15.4y = 15.8x + 15.8y$$

$$\text{Or, } 16.4x - 15.8y = 15.8y - 15.4y$$

$$\text{Or, } 0.6x = 0.4y$$

$$\text{Or, } x/y = 0.4/0.6$$

$$\therefore x:y = 2:3$$

\therefore The ratio is 2:3. (Ans.)

13. A bus hired at the cost of Tk. 2400 and it was decided that every student would share the cost equally. But 10 more students jointed and as a result the fare decreased by Tk. 8 per person. How many students were travelling in the bus? (AD FF 15)

Solution:

Let, initially students be 'x' and finally travelled (x+10).

According to the question,

$$\frac{2400}{x} - \frac{2400}{x+10} = 8$$

$$\text{Or, } \frac{2400(x+10) - 2400x}{x(x+10)} = 8$$

$$\text{Or, } \frac{2400x + 24000 - 2400x}{x^2 + 10x} = 8$$

$$\text{Or, } \frac{24000}{x^2 + 10x} = 8$$

$$\text{Or, } 8(x^2 + 10x) = 24000$$

$$\text{Or, } x^2 + 10x = 3000$$

$$\text{Or, } x^2 + 10x - 3000 = 0$$

$$\text{Or, } x^2 + 60x - 50x - 3000 = 0$$

$$\text{Or, } (x+60)(x-50) = 0$$

$$\therefore x = 50. [x = -60, \text{ not acceptable}]$$

So, finally travelled = 50 + 10 = 60 Student. (Ans.)

14. If $(x + \frac{1}{x}) = 3$, then the value of $(x^6 + \frac{1}{x^6}) = ?$ (AD FF 15)

Solution:

Given,

$$(x + \frac{1}{x}) = 3$$

$$\text{Or, } (x + \frac{1}{x})^2 = 3^2 \text{ [Square both side]}$$

$$\text{Or, } x^2 + 2 \cdot x \cdot \frac{1}{x} + \frac{1}{x^2} = 9$$

$$\text{Or, } x^2 + 2 + \frac{1}{x^2} = 9$$

$$\text{Or, } x^2 + \frac{1}{x^2} = 9 - 2$$

$$\text{Or, } x^2 + \frac{1}{x^2} = 7$$

$$\text{Or, } (x^2 + \frac{1}{x^2})^3 = 7^3 \text{ [cube both side]}$$

$$\text{Or, } (x^2)^3 + (\frac{1}{x^2})^3 + 3 \cdot x^2 \cdot \frac{1}{x^2} (x^2 + \frac{1}{x^2}) = 343$$

$$\text{Or, } x^6 + \frac{1}{x^6} + 3 \cdot 7 = 343 \text{ [Because, } x^2 + \frac{1}{x^2} = 7]$$

$$\text{Or, } x^6 + \frac{1}{x^6} = 343 - 21$$

$$\therefore x^6 + \frac{1}{x^6} = 322 \text{ (Ans.)}$$

2. Janata Bank Ltd

1. In 2005, the number of pairs of the shoes that a company sold to retailers decreased by 20 percent, while the price per pair increased by 20 percent from that of the previous year. The company's revenue from sales of the shoes in 2005 was taka 300000. What was the revenue from the sale of the shoes in previous year? (IT AEO 16)

Solution:

Let, previous year,

Shoes sold = x numbers and price per shoes=y Tk.

∴ Total revenue= xy Tk.

In 2005,

Shoes sold = (x- 0.20x) numbers and price per shoes=(y+0.20y) Tk.

According to the question,

$$(x- 0.20x) \times (y+0.20y) = 300000$$

$$\text{Or, } 0.80x \times 1.20y = 300000$$

$$\therefore xy = 312500$$

$$\therefore \text{Total revenue} = 3,12,500 \text{ Tk. (Ans.)}$$

Alternative Method:

Suppose, the company sold 10 pair of shoes in 2004 and price was Tk. 10 per pair.

So, revenue was Tk. $10 \times 10 = \text{Tk. } 100$.

In 2005, price increased to Tk. 12 and selling unit decreased to 8.

So, revenue in 2005 was Tk. $12 \times 8 = \text{Tk. } 96$.

$$\begin{aligned} \text{Thus, actual revenue in 2004 was Tk. } & (3,00,000 \times 100) / 96 \\ & = \text{Tk. } 3,12,500 \text{ (Ans.)} \end{aligned}$$

2. A manufacturing company uses two machines A and B with different production capacities. When working alone, machine A can produce a production lot in 5 hours and machine B can produce the same lot in X hour. When the two machines operate simultaneously to fill the same production lot, it takes them 2 hours to complete the job. How many hours will the machine B take to produce the production lot alone? (IT AEO 16)

Solution:

Let, in x hours B can complete 1 part

∴ in 1 hour B can complete $1/x$ part.

In 5 hours A can complete 1 part,

∴ in 1 hour A can complete $1/5$ part.

If they both worked together they can do in 1 hour = $1/2$ part

According to the question,

$$1/2 - 1/5 = 1/x$$

$$\text{Or, } (5-2)/10 = 1/x$$

$$\text{Or, } 3/10 = 1/x$$

$$\text{Or, } 3x = 10$$

$$\therefore x = 10/3$$

$$= 3.33 \text{ hours or } 3 \text{ hours } 20 \text{ min. (Ans.)}$$

Alternative Method:

Let, A can produce y products in 5 hours and B can produce y products in x hours.

According to the question,

$$\frac{y}{5} + \frac{y}{x} = \frac{y}{2}$$

$$\text{Or, } y \left(\frac{1}{5} + \frac{1}{x} \right) = \frac{y}{2}$$

$$\text{Or, } \left(\frac{1}{5} + \frac{1}{x} \right) = \frac{1}{2}$$

$$\text{Or, } (5-2)/10 = 1/x$$

$$\text{Or, } 3/10 = 1/x$$

$$\text{Or, } 3x = 10$$

$$\therefore x = 10/3 = 3.33 \text{ hours or } 3 \text{ hours } 20 \text{ min. (Ans.)}$$

3. Interest on 500 Tk. for 4 years and 600 Tk. for 5 years is 500 Tk. What is the interest on Tk. 1000 for 3 years? (IT AEO 16)

Solution:

We know,

Interest= Principal× Time× Rate of interest

Let, rate of interest= r

According to the question,

$$500 \times 4 \times r\% + 600 \times 5 \times r\% = 500$$

$$\text{Or, } 500 \times 4 \times \frac{r}{100} + 600 \times 5 \times \frac{r}{100} = 500$$

$$\text{Or, } 20r + 30r = 500$$

$$\text{Or, } 50r = 500$$

$$\therefore r = 10$$

$$\therefore \text{Rate of interest } 10\%$$

$$\therefore \text{Interest} = 1000 \times 3 \times 10\% \\ = 300 \text{ Tk.}$$

Ans: 300 Tk.

4. Sumon and Shimul two friends started a business with 5000 Tk and 4000 Tk respectively. After 3 months Mr. Sumon added 1000 Tk and simultaneously Dilip joined with them with 7000 Tk. What is the share of profit among them after one year if profit is 36000 Tk? (IT AEO 16)

Solution:

Equivalent amount of Sumon= $5000 \times 3 + (5000 + 1000) \times 9 = 69,000$ Tk.

Equivalent amount of Shimul= $4000 \times 12 = 48,000$ Tk.

Equivalent amount of Dilip= $7000 \times 9 = 63,000$ Tk.

$$\therefore \text{Sumon: Shimul : Dilip} = 69,000 : 48,000 : 63,000$$

$$= 23 : 16 : 21$$

$$= 23 : 16 : 21$$

$$\text{Sum of the ratios} = 23 + 16 + 21 = 60$$

\therefore Profit share of,

$$\text{Sumon} = \left(36000 \times \frac{23}{60} \right) \text{ Tk.} = 13800 \text{ Tk.}$$

$$\text{Shimul} = \left(36000 \times \frac{16}{60} \right) \text{ Tk.} = 9600 \text{ Tk.}$$

$$\text{Dilip} = \left(36000 \times \frac{21}{60} \right) \text{ Tk.} = 12600 \text{ Tk.}$$

Ans: 13800 Tk, 9600 Tk and 12600 Tk.

5. Mr. Zaman leaves for his office at a certain fixed time. If he walks at the rate 5 km per hour (km/h) he is late by 7 minutes. If he walks at the rate of 6 km/h, he reaches the office 5 minutes earlier. How far is the office from his house? (Financial Analyst 15)

Solution:

Let, his office is X km away from his house.

Difference of time= $(5+7) \text{ min} = 12 \text{ min} = \frac{1}{5} \text{ hour.}$

According to the question,

$$\frac{X}{5} - \frac{X}{6} = \frac{1}{5}$$

$$\text{Or, } \frac{6X - 5X}{30} = \frac{1}{5}$$

$$\text{Or, } \frac{X}{30} = \frac{1}{5}$$

$$\text{Or, } X = \frac{1 \times 30}{5}$$

$$\therefore x = 6 \text{ km.}$$

\therefore Distance 6 km. (**Ans.**)

6. A depositor deposited Tk. 4000 at x% simple interest and Tk. 5000 at y% simple interest. He received annual interest of Tk. 320 on his deposited amounts at the year end. If he could deposit Tk. 5000 at x% simple interest and Tk. 4000 at y% simple interest, he would receive annual interest of Tk. 310. Find the value of x and y.
(Financial Analyst 15)

Solution:

According to the question,

Condition-1

$$x\% \text{ of } 4000 + y\% \text{ of } 5000 = 320$$

$$\text{Or, } \frac{x}{100} \times 4000 + \frac{y}{100} \times 5000 = 320$$

$$\text{Or, } 40x + 50y = 320$$

$$\therefore 4x + 5y = 32 \text{ ----- (i)}$$

Condition-2

$$x\% \text{ of } 5000 + y\% \text{ of } 4000 = 310$$

$$\text{Or, } \frac{x}{100} \times 5000 + \frac{y}{100} \times 4000 = 310$$

$$\text{Or, } 50x + 40y = 310$$

$$\therefore 5x + 4y = 31 \text{ ----- (ii)}$$

$$\text{Now, (i)} \times 5 - \text{(ii)} \times 4 \Rightarrow$$

$$25y - 16y = 160 - 124$$

$$\text{Or, } 9y = 36$$

$$\therefore y = 4$$

By putting the value of y into the equation (ii), we get

$$5x + 4 \times 4 = 31$$

$$\text{Or, } 5x = 31 - 16$$

$$\text{Or, } 5x = 15$$

$$\therefore x = 3$$

Ans: x=3 and y=4

7. Solve the problem: $\frac{3}{x+1} + \frac{6}{2x+1} = \frac{18}{3x+1}$ (Financial Analyst 15)

Solution:

$$\frac{3}{x+1} + \frac{6}{2x+1} = \frac{18}{3x+1}$$

$$\text{Or, } \frac{3}{x+1} + \frac{6}{2x+1} = \frac{9+9}{3x+1}$$

$$\text{Or, } \frac{3}{x+1} - \frac{9}{3x+1} = \frac{9}{3x+1} - \frac{6}{2x+1}$$

$$\text{Or, } \frac{3(3x+1) - 9(x+1)}{(x+1)(3x+1)} = \frac{9(2x+1) - 6(3x+1)}{(2x+1)(3x+1)}$$

$$\text{Or, } \frac{9x+3-9x-9}{(x+1)(3x+1)} = \frac{18x+9-18x-6}{(2x+1)(3x+1)}$$

$$\text{Or, } \frac{-6}{(x+1)(3x+1)} = \frac{3}{(2x+1)(3x+1)}$$

$$\text{Or, } \frac{-2}{(x+1)} = \frac{1}{(2x+1)}$$

$$\text{Or, } x+1 = -4x-2$$

$$\text{Or, } x+4x = -2-1$$

$$\text{Or, } 5x = -3$$

$$\therefore x = -\frac{3}{5}$$

$$\therefore \text{The required solution, } x = -\frac{3}{5}$$

8. Find the value of $x^4 + \frac{1}{x^4}$, if $x = \sqrt{5} - \sqrt{4}$ (Financial Analyst 15)

Solution:

Given that, $x = \sqrt{5} - \sqrt{4}$

$$\frac{1}{x} = \frac{1}{\sqrt{5} - \sqrt{4}}$$

$$\text{Or, } \frac{1}{x} = \frac{1 \times (\sqrt{5} + \sqrt{4})}{(\sqrt{5} + \sqrt{4})(\sqrt{5} - \sqrt{4})}$$

$$\text{Or, } \frac{1}{x} = \frac{(\sqrt{5} + \sqrt{4})}{(\sqrt{5})^2 - (\sqrt{4})^2}$$

$$\text{Or, } \frac{1}{x} = \frac{(\sqrt{5} + \sqrt{4})}{5 - 4}$$

$$\therefore \frac{1}{x} = (\sqrt{5} + \sqrt{4})$$

$$\therefore x + \frac{1}{x} = \sqrt{5} - \sqrt{4} + \sqrt{5} + \sqrt{4} = 2\sqrt{5}$$

Now,

$$x + \frac{1}{x} = 2\sqrt{5}$$

$$\text{Or, } \left(x + \frac{1}{x}\right)^2 = (2\sqrt{5})^2$$

$$\text{Or, } x^2 + \frac{1}{x^2} + 2 \cdot x \cdot \frac{1}{x} = 4 \times 5$$

$$\text{Or, } x^2 + \frac{1}{x^2} + 2 = 20$$

$$\text{Or, } x^2 + \frac{1}{x^2} = 20 - 2 = 18$$

$$\text{Or, } \left(x^2 + \frac{1}{x^2}\right)^2 = (18)^2$$

$$\text{Or, } \left(x^2\right)^2 + \left(\frac{1}{x^2}\right)^2 + 2 \cdot x^2 \cdot \frac{1}{x^2} = 324$$

$$\text{Or, } x^4 + \frac{1}{x^4} + 2 = 324$$

$$\text{Or, } x^4 + \frac{1}{x^4} = 324 - 2$$

$$\therefore x^4 + \frac{1}{x^4} = 322 \text{ (Ans.)}$$

9. In a two digit number, the digit in the units place is more than twice the digit in ten's place by 1. If the digits in the units place and the ten's place are interchanged, the difference between the newly formed number and the original number is less than the original number by 1, what is the original number? (AEO 15)

Solution:

Let, ten's digit = x ,

So unit's digit = $2x + 1$,

\therefore The number is $= 10x + (2x + 1) = 12x + 1$

& the alternate number $= 10(2x + 1) + x = 21x + 10$

According to question,

$$(21x + 10) - (12x + 1) = (12x + 1) - 1$$

$$\text{Or, } 21x + 10 - 12x - 1 = 12x + 1 - 1$$

$$\text{Or, } 9x + 9 = 12x$$

$$\text{Or, } 3x = 9$$

$$\therefore x = 3$$

So, the number is $= 10 \times 3 + 2 \times 3 + 1 = 37$ (Ans).

10. A, B & C Started a business each investing Tk 20,000, after Five months A withdraw Tk 5000, B withdraw Tk 4000 and C invests Tk 6000 more. At the end of the year a total profit of Tk 69,900 was recorded. Find the share of each. (AEO 15)

Solution:

Let us consider, $k = 1000$ Tk

then, ratio is, A:B:C $= 20k \times 5 + 15k \times 7 : 20k \times 5 + 16k \times 7 : 20k \times 5 + 26k \times 7$

$$= 205k : 212k : 282k$$

$$= 205 : 212 : 282$$

\therefore Sum of the ratio $= 205 + 212 + 282 = 699$

profit,

$$\therefore A = \frac{205 \times 69900}{699}$$

$$= 20500$$

$$\therefore B = \frac{212 \times 69900}{699}$$

$$= 21200$$

$$\therefore C = \frac{282 \times 69900}{699}$$

$$= 28200 \text{ Ans.}$$

11. A machine P can print 1 lakh books in 8 hour, Q can same in 10 hour & R can print them in 12 hour. All the machine r started at 9 AM, while machine P in closed at 11 am and the remaining two machine complete the work. Approximately at what time the work will be finished? (AEO 15)

Solution:

In 1 hour, (P + Q + R) work = $(1/8 + 1/10 + 1/12)$
 $= 37/120$ part

Work done by P, Q and R in 2 hours = $(37 \times 2)/120$
 $= 37/60$ part

Remaining work = $(1 - 37/60)$
 $= 23/60$ part

In 1 hour, (Q + R) work = $(1/10 + 1/12)$
 $= 11/60$ part

Now, 11/60 part work is done by Q and R in 1 hour

So, 23/60 part work will be done by Q and R in $(\frac{60}{11} \times \frac{23}{60})$
 $= 23/11$ hours
 ≈ 2 hours.

So, the work will be finished approximately after 2 hours around 1 P.M. (Ans)

12. If sugar price reduced 25/4%, then one can buy 1kg more sugar at 120Tk. Find the rate of original and reduced price. (Cash 15)

Solution:

Let, the original rate = X Tk/kg,

So, in 120 Tk sugar can be found = $120/X$ kg

Now, 25/4% discount in X Tk = $\frac{25X}{4 \times 100} = X/16$ Tk

So, discount rate = $X - X/16 = \frac{15X}{16}$ Tk per kg

and in 120 Tk we can found = $\frac{120 \times 16}{15X}$ kg sugar

According to question,

$$\frac{120 \times 16}{15X} - 120/X = 1$$

$$\text{Or, } \frac{120}{15X} = 1,$$

$$\text{Or, } x = 8 \text{ Tk/kg}$$

$$\text{So, discount price is } = \frac{15 \times 8}{16} \text{ Tk/kg}$$

$$= 7.5 \text{ Tk/kg}$$

Ans: Original price 8 Tk/kg. and reduced price 7.5 Tk/kg.

13. If 2 men and 3 boys can do a piece of work in 10 days; and if 3 men and 2 boys can do the same piece of work in 8 days, then 2 men and 1 boy can do that work in how many days? (Cash 15)

Solution:

In 1 day,

2 men and 3 boy do = 1/10 part (1)

3 men and 2 boy do = 1/8 part (2)

5 men and 5 boy do = 9/40 part

So, in 1 day 1 man and 1 boy do = 9/200 part (3)

We find from (2) – (3)

$$2 \text{ men and 1 boy do } = 1/8 - 9/200 \text{ part}$$

$$= (25 - 9)/200 \text{ part}$$

$$= 2/25 \text{ part}$$

So, 2 men and 1 boy do 2/25 part work in 1 day

$$2 \text{ men and 1 boy do 1 part(whole) work in } 25/2 \text{ days}$$

$$= 12.5 \text{ days (Ans)}$$

14. A total amount of 1550 Tk was invested in two parts. One part is 8% rate and the other part is 6% rate. If the annual income is Tk 106, then how much money was invested in each part? (Cash 15)

Solution:

Let, at 8% invest is = x Tk

And at 6% invest is = (1550 - x) Tk

The interest on Tk x = $8x/100$ Tk

And interest on Tk (1550 - x) = $6(1550 - x)/100$ Tk

According to the question,

$$6(1550 - x)/100 + 8x/100 = 106$$

$$\text{Or, } (1550 - x) \times 6 + 8x = 106 \times 100$$

$$\text{Or, } 9300 - 6x + 8x = 10600$$

$$\text{Or, } 2x = 10600 - 9300$$

$$\text{Or, } x = 650$$

At 8% invest is 650 Tk

And at 6% invest is (1550 - 650) = 900Tk (Ans)

3. Rajshahi Krishi Unnayan Bank(RAKUB)

1. In a partnership, A invest 1/6 of the capital for 1/6 of the time, B invests 1/3 of the capital for 1/3 of the time and C, the rest of the capital for the whole time. Out of profit of Tk. 4600, B's share is: (Officer 16)

Solution:

Let, total money be 'x' Tk. and total time be 'y' month.

A invests Tk. $x/6$ for $y/6$ months and B invests Tk. $x/3$ for $y/3$ months.

So, C invests = $x - (x/6 + x/3) = x/2$ Tk. for y months.

$$\begin{aligned} A : B : C &= (x/6 \times y/6) : (x/3 \times y/3) : (x/2 \times y) \\ &= 1/36 : 1/9 : 1/2 \\ &= 1 : 4 : 18 \end{aligned}$$

$$\therefore \text{Sum of the ratios} = 1 + 4 + 18 = 23$$

$$\begin{aligned} \therefore \text{B's share} &= \text{Tk. } (4600 \times 4/23) \\ &= \text{Tk. 800. (Ans.)} \end{aligned}$$

2. A can do a piece work in 10 days, while B alone can do it in 15 days. They work together for 5 days; the rest of the work is done by C in 2 days. If they get Tk 450 for whole work, how should they divide money? (Officer 16)

Solution:

A does in 1 day = $1/10$ portion,

So, in 5 days = $1/2$ portion

Similarly, B does in 1 day = $1/15$ portion

\therefore B does in 5 days = $1/3$ portion

\therefore In 5 days (A+B) work = $1/2 + 1/3 = 5/6$ portion

So, in 2 days C does work = $(1 - 5/6) = 1/6$ portion

Now,

$$\text{Share of A} = 450 \times (1/2) = 225 \text{ Tk}$$

$$\text{Share of B} = 450 \times (1/3) = 150 \text{ Tk}$$

$$\text{Share of C} = 450 \times (1/6) = 75 \text{ Tk (Ans.)}$$

3. The speed of a boat in still water is 10 km per hr. If it can travel 24 km downstream and 14 km in the upstream in equal time, indicate the speed of the flow of stream. (Officer 16)

Solution:

Let, speed of stream be x km/h

So, downstream speed = $(10 + x)$ km/h

and upstream speed = $(10 - x)$ km/h.

According to the question,

$$\frac{24}{10 + x} = \frac{14}{10 - x}$$

$$\text{Or, } 140 + 14x = 240 - 24x$$

$$\text{Or, } 14x + 24x = 240 - 140$$

$$\text{Or, } 38x = 100$$

$$\text{Or, } x = 100/38$$

$$\therefore x = 50/19 \text{ (Ans.)}$$

4. A company whose annual sales are currently Tk. 500000 has been experiencing sales increase of 20% per year. Assuming this rate of growth continues, what will the annual sales be in five years? (Officer 16)

Solution:

Let, initial sales amount be Tk. x .

At 20% increasing,

1st year sales amount= 120% of $x = 1.2x$ Tk.

2nd year sales amount= 120% of $1.2x = \text{Tk. } 1.44x$

3rd year sales amount= 120% of $1.44x = \text{Tk. } 1.728x$

4th year sales amount= 120% of $1.728x = \text{Tk. } 2.0736x$

5th year sales amount= 120% of $2.0736x = \text{Tk. } 2.48832x$

After 5 years sales amount= Tk. $2.48832x$

= Tk. $2.48832 \times 500,000$

= Tk. 1244160 (Ans.)

5. A person invested $\frac{2}{3}$ rd of his capital at 3%, $\frac{1}{6}$ th at 6% and the remainder at 12%. Find out the amount of capital if his annual income is TK. 25. (SO 15)

Solution:

Let, the amount of capital be Tk. x

Capital invested at 12% = $(1 - \frac{2}{3} - \frac{1}{6})$ part = $\frac{1}{6}$ part.

According to the question,

3% of $\frac{2}{3}x + 6\%$ of $\frac{1}{6}x + 12\%$ of $\frac{1}{6}x = 25$

Or, $\frac{2x}{100} + \frac{x}{100} + \frac{2x}{100} = 25$

Or, $\frac{2x+x+2x}{100} = 25$

Or, $5x/100 = 25$

$\therefore x = 500$

\therefore The amount of capital is Tk. 500 (Ans.)

6. A tank is filled in 5 hrs by three pipes A,B and C. The pipe C is twice as fast as B and B is twice as fast as A. How much time will pipe A alone take to fill the tank? (SO 15)

Solution:

Let, pipe A alone takes x hours to fill the tank.

So, pipes B and C will take $x/2$ and $x/4$ hours respectively to fill the tank.

According to the question,

$\frac{1}{x} + \frac{2}{x} + \frac{4}{x} = \frac{1}{5}$

Or, $\frac{1+2+4}{x} = \frac{1}{5}$

Or, $\frac{7}{x} = \frac{1}{5}$

$\therefore x = 35$

\therefore Pipe A alone takes x hours to fill the tank. (Ans.)

7. 10 years ago the ratio of ages of father and son was 4:1. After 10 years the ratio of father and son will be 2:1. Find the present age of father and son. (SO 15)

Solution:

Let, the present age of father be F years and son be S years.

According to the question,

$(F-10): (S-10) = 4:1$

Or, $F-10 = 4(S-10)$

$\therefore F = 4S-30 \dots (i)$

And,

$(F+10): (S+10) = 2:1$

Or, $2(S+10) = F+10$

Or, $2S+20 = 4S-30+10$

Or, $4S-2S = 20+20$

Or, $2S = 40$

$\therefore S = 20$

$\therefore F = 4 \times 20 - 30 = 50$

\therefore Present age of Son=20 years and father= 50 years. (Ans.)

Alternative Method:

Let, the present age of father be $(4x+10)$ years and son be $(x+10)$ years.

After 10 years,

$$(4x+10+10):(x+10+10)=2:1$$

$$\text{Or, } (4x+20):(x+20)=2:1$$

$$\text{Or, } 4x+20=2(x+20)$$

$$\text{Or, } 4x+20=2x+40$$

$$\text{Or, } 4x-2x=40-20$$

$$\therefore x=10$$

\therefore The present age of father be $(4 \times 10 + 10) = 50$ years and son be $(10 + 10) = 20$ years. (Ans.)

8. Two men and three boys can do a piece of work in ten days while three man and two boys can do the same work in eight days. In how many days can two men and one boy do the work? (SO 15)

Solution:

Let, 1 man's 1 day's work = M part and 1 boy's 1 day's work = B part of the work.

$$2M + 3B = 1/10 \dots (i)$$

$$3M + 2B = 1/8 \dots (ii)$$

$$(i) \times 3 - (ii) \times 2$$

$$6M + 9B = 3/10$$

$$6M + 4B = 1/4$$

$$5B = 3/10 - 1/4$$

$$\text{Or, } 5B = 1/20$$

$$\therefore B = 1/100 \text{ part.}$$

Putting value B into question (i)

$$3M + 2/100 = 1/8$$

$$\text{Or, } 3M = 1/8 - 2/100$$

$$\therefore M = 7/200 \text{ part.}$$

Now,

$$2M + 1B = 2(7/200) + 1/100$$

$$= 2/25 \text{ part.}$$

$2/25$ part can do in 1 days

\therefore 1 part(whole) work can do in $25/2$ days = 12.5 days.

Ans: 12.5 days.

4. Pubali bank

1. A certain sum of money amounts to Tk. 1008 in 2 years and to Tk.1164 in $3\frac{1}{2}$ years. Find the sum and rate of interest. (SO/O 16)

Solution:

In 3.5 years sum of money amounted to= Tk. 1164

In 2 years sum of money amounted to = Tk. 1008

$$\therefore \text{ in } (3.5-2)=1.5 \text{ years interest} = (1164-1008) = \text{Tk. } 156$$

$$\therefore \text{ in 1 year interest} = \text{Tk. } 156/1.5$$

$$= \text{Tk. } 104$$

$$\therefore \text{ Sum} = 1008 - (104 \times 2)$$

$$= \text{Tk. } 800$$

We know,

$$I = pnr/100$$

$$\therefore r = 100I/pn$$

$$= \frac{100 \times 104}{800 \times 1} \%$$

$$= 13 \%$$

$$\therefore \text{ Rate of interest} = 13\%$$

Ans: Sum Tk. 800 and rate of interest 13%.

2. A room is half as long again as it is broad. The cost of carpeting the room at Tk. 5 per sq. m is Tk. 270 and the cost of papering the four walls at Tk. 10 per sq. m is Tk. 1720. If a door and 2 windows occupy 8 sq. m, find the dimensions of the room. (SO/O 16)

Solution:

Let, breadth = x meters, length = $(x+x/2) = 3x/2$ meters and height = h meters.

Area of the floor = Total cost of carpeting / Rate

$$= (270/5) \text{ sq. m}$$

$$= 54 \text{ sq. m}$$

Now,

Breadth \times Length = Area

$$x \times (3x/2) = 54$$

$$\text{Or, } x^2 = \frac{54 \times 2}{3}$$

$$\text{Or, } x^2 = 36$$

$$\therefore x = 6.$$

So, breadth = 6 m and length = $(3/2) \times 6 = 9$ m.

Now, papered area = $(1720/10)$ sq. m

$$= 172 \text{ sq. m}$$

Area of one door and two windows = 8 sq. m

\therefore Total area of 4 walls = $(172 + 8)$ sq. m

$$= 180 \text{ sq. m}$$

According to the question,

$$2(9 + 6) \times h = 180 \text{ [Note: Total area of 4 walls = পরিসীমা \times উচ্চতা]}$$

$$\text{Or, } 30h = 180$$

$$\text{Or, } h = 180/30$$

$$\therefore h = 6$$

\therefore Height 6 m.

Ans: breadth = 6 m, length = 9 m and height 6 m.

3. Four milkmen rented a pasture. A grazed 24 cows for 3 months; B 10 for 5 months; C 35 cows for 4 months and D 21 cows for 3 months. If A's share of rent is Tk. 720, find the total rent of the field. (SO/O 16)

Solution:

$$\text{Ratio of shares of A : B : C : D} = (24 \times 3) : (10 \times 5) : (35 \times 4) : (21 \times 3) \\ = 72 : 50 : 140 : 63.$$

$$\text{Sum of the ratios} = 72 + 50 + 140 + 63 = 324$$

Let, total rent be Tk. x.

$$\text{Then, A's share} = \text{Tk. } \frac{72x}{325}$$

According to the question,

$$\frac{72x}{325} = 720 \text{ Tk.}$$

$$\text{Or, } x = \frac{720 \times 325}{72} \text{ Tk.}$$

$$\therefore x = 3250$$

\therefore Total rent 3250 Tk. (Ans.)

4. The simple interest on a certain sum of money for 2.5 years at 12% per annum is Tk. 40 less than the simple interest on the same sum for 3.5 years at 10% per annum. Find the sum. (JO Cash 16)

Solution:

We know,

Interest (I) = principle (p) \times Time (n) \times rate of interest (r)

Here, Sum = p, $n_1 = 3.5$ years, $r_1 = 10\%$, $n_2 = 2.5$ and $r_2 = 12\%$

According to the question,

$$pn_1r_1 - pn_2r_2 = 40$$

$$p \times 3.5 \times 10\% - p \times 2.5 \times 12\% = 40$$

$$\text{Or, } \frac{35p}{100} - \frac{30p}{100} = 40$$

$$\text{Or, } (35p - 30p) 4000$$

$$\text{Or, } 5p = 4000$$

$$\therefore p = 800$$

\therefore The sum is Tk. 800. (Ans.)

5. A, B and C started a business by investing Tk. 1,20,000, Tk. 1,35,000 and Tk. 1,50,000 respectively. Find the share of each out of an annual profit of Tk. 56,700. (JO Cash 16)

Solution:

Ratio of shares A: B:C = 120000 : 135000 : 150000
= 8: 9: 10

Sum of the ratios= 8+9+10=27

A's share = $(56700 \times \frac{8}{27})$ =Tk. 16800

B's share = $(56700 \times \frac{9}{27})$ =Tk. 18900

C's share = $(56700 \times \frac{10}{27})$ =Tk. 21000

Ans: Tk. 16800, Tk. 18900 and Tk. 21000.

6. A retailer buys 40 pens at the market price of 36 pens from a wholesaler. If he sells these pens giving a discount of 1%, what is the profit percent? (JO Cash 16)

Solution:

Let, the market price of each pen to be Tk 10,

So, the market price of 36 pens = Tk. (36×10)= Tk. 360

Buying price of 40 pens =Tk. 360

∴ Buying price of each pen = 360/40 =Tk. 9

In 1% discount,

Selling price = 99% of 10 = Tk. 9.90

∴ Profit = 9.90 – 9.00 =Tk. 0.90

∴ Profit percentage = $\frac{0.90 \times 100}{9.00} \%$
= 10%

∴ Profit is 10% (**Ans.**)

Alternative Method:

Let,

40 pens buy at Tk. p

∴ 1 " " Tk. p/40.

36 pens sell at Tk. p

∴ 1 " " Tk. p/36.

In 1% discount,

Selling price = 99% of $\frac{p}{36}$ Tk.

= $\frac{99}{100}$ of $\frac{p}{36}$ Tk.

= $\frac{11p}{400}$ Tk.

∴ Profit= $(\frac{11p}{400} - \frac{p}{40})$ Tk.
= $\frac{p}{400}$ Tk.

In Tk. $\frac{p}{40}$, profit is $\frac{p}{400}$ Tk.

∴ " Tk. 1 " " $\frac{p \times 40}{400 \times p}$ Tk.

∴ " Tk. 100 " " $\frac{p \times 40 \times 100}{400 \times p}$ Tk.
= 10 Tk.

∴ Profit is 10% (**Ans.**)

5. Dutch Bangla Bank

1. Amena can do a work in 4 days. Amena and Cathy can do in 2 days. Basher and Cathy can do in 3 days. In how many days Basher alone can finish the work? (PO 15)

Solution:

Let, whole work is 1 part.

Amena can do in 1 day $\frac{1}{4}$ part of the job.

Amena and Cathy can do in 1 day $\frac{1}{2}$ part of the work.

Cathy alone can do in 1 day $= \frac{1}{2} - \frac{1}{4} = \frac{1}{4}$ part of the work.

Basher and Cathy can do in 1 day $= \frac{1}{3}$ part of the work.

Basher alone can do in 1 day $= \frac{1}{3} - \frac{1}{4} = \frac{1}{12}$ part of the work.

$\frac{1}{12}$ Part of the work is done in 1 day

\therefore 1 part of the work is done in 12 days.

Ans: 12 days.

2. Zainul covers a distance of 340 miles between Dhaka and Rajshahi taking a total of 5 hours. If part of the distance was covered at a speed of 60 miles per hour and the rest at a speed of 80 miles per hour, how many hours did she travel at 60 miles per hour? (PO 15)

Solution:

Let, he travelled x hour speed at 60 mile/h.

So, he travelled (5-x) hour speed at 80 mile/h.

According to question,

$$60 \times x + (5-x)80 = 340 \quad [\text{Distance} = \text{Speed} \times \text{Time}]$$

$$\text{Or, } 60x + 400 - 80x = 340$$

$$\text{Or, } -20x = 340 - 400$$

$$\text{Or, } -20x = -60$$

$$\therefore x = 3$$

So, 3 hours he travelled at 60 miles per hour. (**Ans.**)

Alternative Method:

Let, he travelled x miles at the speed of 60 mile/h and (340-x) miles at the speed of 80 mile/h.

According to question,

$$\frac{x}{60} + \frac{340-x}{80} = 5 \quad [\text{Time} = \text{Distance}/\text{Speed}]$$

$$\text{Or, } \frac{4x + 3(340-x)}{240} = 5$$

$$\text{Or, } 4x + 1020 - 3x = 1200$$

$$\text{Or, } x = 1200 - 1020$$

$$\therefore x = 180$$

We know,

$$\text{Time} = \text{Distance}/\text{Speed} = 180/60 = 3 \text{ hours.}$$

So, 3 hours he travelled at 60 miles per hour. (**Ans.**)

6. National Bank

1. Given, $x = 3 + \sqrt{8}$, find the value of $x^2 + \frac{1}{x^2}$? (PO 15)

Solution:

Given that, $x = 3 + \sqrt{8}$

$$\begin{aligned} \therefore \frac{1}{x} &= \frac{1}{3 + \sqrt{8}} \\ &= \frac{1 \times (3 - \sqrt{8})}{(3 + \sqrt{8})(3 - \sqrt{8})} \\ &= \frac{(3 - \sqrt{8})}{3^2 - (\sqrt{8})^2} \\ &= \frac{(3 - \sqrt{8})}{9 - 8} \end{aligned}$$

$$\therefore \frac{1}{x} = (3 - \sqrt{8})$$

$$\text{Now, } x + \frac{1}{x} = 3 + \sqrt{8} + 3 - \sqrt{8} = 6$$

$$\therefore x^2 + \frac{1}{x^2} = (x + \frac{1}{x})^2 - 2 \times x \times \frac{1}{x} = 6^2 - 2 = 36 - 2 = 34.$$

Ans: 34

2. A sum of money is to be distributed equally among a group of children. If there were 25 children less than each would get TK. 1.50 more, and if there 50 children more, each would get TK. 1.50 less. Find the number of children and the amount of money distributed. (PO 15)

Solution:

Let, amount= x and children = y

According to question:

$$\frac{x}{y-25} - \frac{x}{y} = 1.50 \quad \dots\dots(i)$$

$$\frac{x}{y} - \frac{x}{y+50} = 1.50 \quad \dots\dots(ii)$$

From equation (i) and (ii) we get

$$\frac{x}{y-25} - \frac{x}{y} = \frac{x}{y} - \frac{x}{y+50}$$

$$\text{Or, } \frac{xy - xy + 25x}{y(y-25)} = \frac{xy + 50x - xy}{y(y+50)}$$

$$\text{Or, } \frac{25x}{y(y-25)} = \frac{50x}{y(y+50)}$$

$$\text{Or, } \frac{1}{(y-25)} = \frac{2}{(y+50)}$$

$$\text{Or, } 2y - 50 = y + 50$$

$$\therefore y = 100$$

Putting the value of y in equation (i) we get,

$$\frac{x}{100-25} - \frac{x}{100} = 1.50$$

$$\text{Or, } x/75 - x/100 = 1.50$$

$$\text{Or, } \frac{4x - 3x}{300} = 1.50$$

$$\text{Or, } x/300 = 1.50$$

$$\therefore x = 450$$

So, the number of children=100 and the amount of money = Tk. 450

Ans: 100 children and Tk. 450.

Alternative Method:

Let, total number of children be ' x ' and money distributed to child ' y '

So, total amount of money = xy

According to the question,

$$xy = (x-25)(y+1.50)$$

$$\text{Or, } xy = xy - 25y - 37.5 + 1.5x$$

$$\therefore 25y + 37.5 = 1.5x \quad \dots\dots(i)$$

Again,

$$xy = (x+50)(y-1.50)$$

$$\text{Or, } xy = xy - 75 + 50y - 1.5x$$

$$\therefore 1.5x = 50y - 75 \quad \dots\dots(ii)$$

From question (i) and (ii)

we get,

$$50y - 75 = 25y + 37.5$$

$$\therefore y = 4.5$$

Now, put the value of y into question (ii)

$$1.5x = 50 \times 4.5 - 75$$

$$\therefore x = 100$$

So, the number of children=100

and the amount of money = Tk. (4.5×100) = Tk. 450

Ans: 100 children and Tk. 450.

3. A video magazine distributor made 3500 copies of the May issue of the magazine at a cost of Tk. 4,00,000. He gave 500 cassettes free to some key video libraries. He also allowed a 25% discount on the market price of the cassette. In this manner, he was able to sell all the 3500 cassettes that were produced. If the market price of a cassettes was Tk. 160, what is his gain or loss for the May issue of the video magazine? (PO 15)

Solution:

Market price of a cassette was Tk. 160.

So, at 25% discount selling price = $160 - 160 \times 25\%$ = Tk. 120.

Now selling price of 3500 cassettes = $500 \times 0 + 120 \times 3000$ = Tk. 3,60,000

\therefore Cost of 3500 cassettes = Tk. 4,00,000

So, loss = $4,00,000 - 3,60,000$ = Tk. 40,000.

Ans: Tk. 40,000.

Alternative Method:

Remain cassettes after free=3500-500=3000

Price=3000×160=Tk. 480,000

∴ After discount he had=480,000-25% of 480,000
=Tk. 360,000

So, loss =4,00,000- 3,60,000 =Tk. 40,000.

Ans: Tk. 40,000.

7. Standard Bank

1. A person deposited money 6% and 7% respectively. If total Tk. 4000 money earns Tk. 250 as interest in 1 year. How much money was invested at 7% interest rate? (TAO 16)

Solution:

Let, at 7% invested x Tk. and at 6% invested (4000-x) Tk.

According to the question,

7% of x+ 6% of (4000-x)= 250

$$\text{Or, } \frac{7}{100} \times x + \frac{6}{100} \times (4000-x) = 250$$

$$\text{Or, } \frac{7x+6(4000-x)}{100} = 250$$

$$\text{Or, } 7x+24000-6x=25000$$

$$\text{Or, } 7x-6x=25000-24000$$

$$\therefore x=1000$$

∴ 1000Tk. invested at 7% interest. (**Ans.**)

2. A trader, while selling an item, was asking for such a price that would enable him to offer a 20% discounts and still make a profit of 30% on cost. If the cost of the item was Tk.50 what was his asking price? (TAO 16)

Solution:

Given that, cost = 50 Tk.

At 30% profit,

Price becomes =130% of 100
= (50×130)/100Tk.
= 65 Tk.

Now,

Let, cost price= 100 Tk.

At 20% discount price =(100-20)= 80 Tk.

When asking price is 80 Tk cost is 100 Tk.

When asking price is 1 Tk cost is 100/80 Tk.

When asking price is 65 Tk cost is (100×65)/80 Tk.
= 81.25 Tk (**Ans.**)

Alternative method:

At 30% profit,

Selling price= 130% of 50= 65 Tk.

Let, asking price be Tk. x

At 20% discount,

Selling price=80% of x= 0.80x

According to the question,

$$0.80x=65$$

$$\text{Or, } x=65/0.80$$

$$\therefore x=81.25$$

∴ Asking price is 81.25 Tk. (**Ans.**)

3. A sales person earns 250 Tk. fixed salary. He also gets 15% commission on total sales. What will be sales volume, if he wants to earn total 1000 Tk? (TAO 16)

Solution:

Given that, fixed salary= 250 Tk.

$$\therefore \text{Commission} = (1000 - 250) \text{ Tk.} \\ = 750 \text{ Tk.}$$

According to the question,

$$15\% = 750 \text{ Tk.}$$

$$\therefore 1\% = 750/15 \text{ Tk.}$$

$$\therefore 100\% = \frac{750 \times 100}{15} \text{ Tk.} \\ = 5000 \text{ Tk.}$$

\therefore Sales volume is 5000 Tk. (Ans.)

Alternative method:

Let, sales volume be p Tk.

$$15\% \text{ of } p + 250 = 1000$$

$$\text{Or, } 0.15p = 1000 - 250$$

$$\text{Or, } 0.15p = 750$$

$$\therefore p = 5000$$

\therefore Sales volume is 5000 Tk. (Ans.)

4. The length of a rectangular field is 3 feet long than its breadth. If the perimeter of rectangular field is 380 feet. What will be area of the field in square feet? (TAO 16)

Solution:

Let, breadth be x feet and length be (x+3) feet.

We know,

$$\text{Perimeter} = 2(\text{breadth} + \text{length})$$

$$= 2(x + x + 3)$$

$$= 2(2x + 3)$$

$$= 4x + 6$$

According to the question,

$$4x + 6 = 380$$

$$\text{Or, } 4x = 380 - 6$$

$$\text{Or, } 4x = 374$$

$$\therefore x = 93.5$$

$$\therefore \text{Breadth} = 93.5 \text{ feet and length} = (93.5 + 3) \text{ feet} = 96.5 \text{ feet}$$

$$\therefore \text{Area of the field} = (\text{length} \times \text{breadth})$$

$$= (96.5 \times 93.5) \text{ sq. feet}$$

$$= 9022.75 \text{ sq. feet (Ans.)}$$

5. A pipe can fill a tank in 30 minutes and other can drain out the tank in 40 minutes. If both pipes are started same time, how much time will be required to fill half of the tank? (TAO 16)

Solution:

First pipe,

In 30 min can fill 1 part of the tank

$$\therefore \text{ " 1 " " " } 1/30 \text{ " " "}$$

Second pipe,

In 40 min can empty 1 part of the tank

$$\therefore \text{ " 1 " " " } 1/40 \text{ " " "}$$

$$\therefore \text{Both in 1 min can fill} = \left(\frac{1}{30} - \frac{1}{40}\right) \text{ part of the tank}$$

$$= \left(\frac{4-3}{120}\right) \text{ " " " "}$$

$$= \left(\frac{1}{120}\right) \text{ " " " "}$$

$\frac{1}{120}$ part of the tank will be filled in 1 min

$$\therefore \text{ 1 " " " " " " " " 120 min}$$

$$\therefore \frac{1}{2} \text{ " " " " " " " " } \left(120 \times \frac{1}{2}\right) \text{ min}$$

$$= 60 \text{ min}$$

Ans: 60 min.

6. A cashier received a total amount of Tk. 10,000 from depositor in a total of 140 notes of Tk. 50 and Tk. 100 denominations. How many notes of Tk. 50 denominations did he receive? (TAO Cash 16)

Solution:

Let, the number 50 Tk. notes be x and the number of 100 Tk. note be (140-x).

According to the question,

$$50x + 100(140 - x) = 10000$$

$$\text{Or, } 50x + 14,000 - 100x = 10,000$$

$$\text{Or, } 50x - 100x = 10,000 - 14,000$$

$$\text{Or, } -50x = -4,000$$

$$\text{Or, } 50x = 4,000$$

$$\therefore x = 80$$

\therefore The number of Tk. 50 notes is 80. (Ans.)

7. A can dig a pond in 30 days and B can dig the same pond in 20 days. In how many days A and B can dig the pond if they work together? (TAO Cash 16)

Solution:

In 30 days A can dig 1 part of the pond

$$\therefore \text{ " 1 " A " " } 1/30 \text{ " " "}$$

In 20 days B can dig 1 part of the pond

$$\therefore \text{ " 1 " B " " } 1/20 \text{ " " "}$$

In 1 day (A+B) can dig = $\left(\frac{1}{30} + \frac{1}{20}\right)$ part of the pond

$$= \left(\frac{2+3}{60}\right) \text{ " " "}$$

$$= \frac{5}{60} \text{ " " "}$$

$$= \frac{1}{12} \text{ " " "}$$

$\frac{1}{12}$ part of the pond can dig in 1 day

$$1 \text{ " " " " " " } 12 \text{ days}$$

Ans: 12 days.

8. A garden is 60 meter long and 20 meter wide. Inside the garden there is a 5 meter wide path around it. What is the area of the path in square meter? (TAO Cash 16)

Solution:

Area of the garden with path = (60×20) sq. m.

$$= 1200 \text{ sq. m.}$$

Area of the garden without path = $(60 - 5 - 5) \times (20 - 5 - 5)$ sq. m.

$$= 50 \times 10 \text{ sq. m.}$$

$$= 500 \text{ sq. m.}$$

\therefore Area of the path = $(1200 - 500)$ sq. m.

$$= 700 \text{ sq. m. (Ans.)}$$

9. The simple interest rate of a bank was reduced to 5% from 7%. As a consequence Karim's income from bank interest was reduced by Tk. 2100 in 5 years. How much is Karim's initial deposit with the bank? (TAO Cash 16)

Solution:

The rate of interest rate reduced = $7\% - 5\% = 2\%$

In 5 years interest reduced = 2100 Tk

In 1 year interest reduced = $2100/5 = 420$ Tk

Tk. 2 reduce when deposit Tk. 100

$$\text{Tk. 1 " " " } 100/2$$

$$\text{Tk. 420 " " " } (100 \times 420)/2$$

$$= 21,000 \text{ Tk (Ans.)}$$

10. Karim and Rahim have equal amount of money. Rumana has half of Rahim's money and Amena has half of Rumana's money. If you add one taka with all the money they have, it will be Tk.100. How much Rahim has? (TAO Cash 16)

Solution:

Let, Amena has = x Tk..

So, Rumana=2x Tk. , Karim and Rahim = 4x Tk.

According to the question,

$$(x+2x+4x+4x)=(100-1)$$

$$\text{Or, } 11x=99$$

$$\therefore x=9.$$

$$\text{So, Rahim has} = 4 \times 9 = 36 \text{ Tk (Ans.)}$$

Alternative method:

Let, Rahim has = x taka

So, Karim has = x taka, Radha has=x/2 taka and

Amena has={ (x/2)/2 }=(x/4) taka

According to the question,

$$x+x+(x/2) + (x/4) + 1=100$$

$$\text{Or, } 11x/4=99$$

$$\text{Or, } x=99 \times (4/11)$$

$$\therefore x=36$$

$$\therefore \text{Rahim has 36 taka only. (Ans.)}$$

11. During the next tree plantation week, Standard bank is considering planting trees in one of its own rectangular piece of land which is 90 feet long 66 feet wide. This is suspended by boundary wall of 5 feet height. It has been decided that trees will be planted leaving 5 feet and free from the wall in all four sides. It was been decide that the distance from one tree to another in both row and column will be 4 feet. What is the maximum numbers of trees that can be planted in the land? (MTO 16)

Solution:

Given that,

The length of the field=90feet

According to the question,

Possible length for plantation=(90-5×2)=80 feet

Width=(66-5×2)=56 feet

Possible row=56/4+1=15 and Possible column=80/4+1=21

$$\therefore \text{Maximum Tree} = 21 \times 15 = 315 \text{ (Ans.)}$$

12. A total of Tk. 1200 is deposited in two saving accounts for one year portion at 5% simple interest and the rest at 7% simple interest. If Tk. 72 was earned as interest, how much was deposited at 5%? (MTO 16)

Solution:

Let, Tk. x be deposited at 5% simple interest and Tk. (1200-x) at 7%.

According to the question,

$$5\% \text{ of } x + 7\% \text{ of } (1200-x) = 72$$

$$\text{Or, } 5x/100 + 7(1200-x)/100 = 72$$

$$\text{Or, } 5x + 8400 - 7x = 7200$$

$$\text{Or, } -2x = 7200 - 8400$$

$$\text{Or, } -2x = -1200$$

$$\therefore x = 600$$

$$\therefore \text{Tk. 600 is deposited at 5\% simple interest. (Ans.)}$$

13. Mr. Akber is a potato seller in a local bazar. When he brings potato from the village market to his shop in the town, he has to pay a minimum of Tk. 100 toll up to total safe of Tk. 1000. For any amount of sale above Tk. 1000, he has to pay an additional toll of 7.5% on the increment amount. If total amount of toll paid was Tk. 257.50 then what were his total sales proceeds from the potatoes? (MTO 16)

Solution:

Let, the increment amount is X Tk.

Toll on safety= Tk 100.

then toll on increment amount =(257.50-100)= 157.50 Tk.

$$\text{Now, } X \times 7.5\% = 157.50$$

$$\text{Or, } X \times 0.075 = 157.50$$

$$\therefore X = 2100$$

$$\therefore \text{Total sales} = 1000 + 2100 = 3100 \text{ Tk (Ans.)}$$

Alternative Method:

Let, total sale x Tk.

According to the question,

$$100+(x-1000) \times 7.5\% = 257.50$$

$$\text{or, } 100 + 0.075x - 75 = 257.50$$

$$\text{or, } 0.075x = 232.5$$

$$\therefore x = 3100 \text{ (Ans)}$$

$$\therefore \text{Total sales} = \text{Tk. } 3100. \text{ (Ans.)}$$

14. Suppose you deposited Tk 10000 on January 1, 2012 at 12.50% interest rate for 1 year. On July 1 2013 Tk 15000 at 12% interest rate for 6 months and on October 1 2013 Tk 20000 at 11.5% interest rate for 3 months (assume that the stated interest rates are simple and annual). Suppose you withdrew all deposits including due interests on December 31, 2013. Calculate the overall annual rate of interest you have received. (MTO 16)

Solution:

$$\begin{aligned} \text{Total investment} &= (10000 + 15000 + 20000) \\ &= 45000 \text{ Tk.} \end{aligned}$$

$$\begin{aligned} \text{Weight of 1st investment} &= 10000/45000 \\ &= 10/45 \end{aligned}$$

$$\begin{aligned} \text{Weight of 2nd investment} &= 15000/45000 \\ &= 15/45 \end{aligned}$$

$$\begin{aligned} \text{Weight of 3rd investment} &= 20000/45000 \\ &= 20/45. \end{aligned}$$

$$\begin{aligned} \therefore \text{Annual Interest} &= [12.5 \times (10/45) + 12 \times (15/45) + 11.5 \times (20/45)]\% \\ &= (2.77 + 4 + 5.11)\% \\ &= 11.89\%. \text{ (Ans.)} \end{aligned}$$

Alternative Method:

$$\begin{aligned} \text{Interest of 1st deposit} &= 10000 \times 12.5\% \\ &= 1250 \text{ Tk.} \end{aligned}$$

$$\begin{aligned} \text{Interest of 2nd deposit} &= 15000 \times 12\% \\ &= 1800 \text{ Tk.} \end{aligned}$$

$$\begin{aligned} \text{Interest of 3rd deposit} &= 20000 \times 11.5\% \\ &= 2300 \text{ Tk.} \end{aligned}$$

$$\begin{aligned} \therefore \text{Total Deposit} &= 10000 + 15000 + 20000 \\ &= 45000 \text{ Tk.} \end{aligned}$$

$$\begin{aligned} \therefore \text{Total Interest} &= 1250 + 1800 + 2300 \\ &= 5350 \end{aligned}$$

$$\begin{aligned} \therefore \text{Overall annual interest rate} &= (5350/45000) \times 100\% \\ &= 11.89\%. \text{ (Ans.)} \end{aligned}$$

8. Midland Bank

1. A basket ball team has won 15 games and lost 9. If these games represent 16.67% of the games to the played, then how many more games must the team win to average 75% for the season? (TO 15)

Solution:

$$\text{Total game that have already been played} = 15 + 9 = 24.$$

According to the question,

$$16.67\% = 24$$

$$\therefore 100\% = (24 \times 100)/16.67$$

$$= 144.$$

$$\text{To win 75\% of the game the team need to win} = 144 \times 75\% = 108.$$

$$\text{So it needs to win } (108 - 15) = 93 \text{ more games.}$$

Ans: 93 games.

2. A person earns yearly interest of Tk. 920 by investing Tk. X at 4% and Tk. Y at 5% simple interest rate. If he had invested Tk. X at 5% and Tk. Y at 4% simple interest rate, then his yearly interest earning would have been reduced by Tk. 40. Find out the amount of X and Y. (TO 15)

Solution:

Given that,

$$X \times 4\% + Y \times 5\% = 920$$

$$\therefore 4x + 5y = 92000 \dots\dots\dots(i)$$

$$\text{And, } X \times 5\% + Y \times 4\% = 880$$

$$\therefore 5x + 4y = 88000 \dots\dots\dots(ii)$$

$$\text{Now, } (i) \times 5 - 4 \times (ii)$$

$$\text{We get, } 9Y = 108,000$$

$$\therefore Y = 12000.$$

$$\text{Now, Interest on } Y = 12000 \times 5\% = 600$$

$$\text{So interest on } X = 920 - 600 = 320.$$

$$\text{So Investment in } X = 320 / 0.04 = 8000 \text{ Tk.}$$

Ans: X=8000 tk and Y= 12,000 tk

3. In a country, 60% of the male citizen and 70% of the female citizen are eligible to vote. 70% of the male & 60% of female citizen is eligible to cast their vote. What fraction of citizens voted during their election? (MTO 15).

Solution:

Let, total number of male = x

Total number of female = y

$$\text{So, male voted} = X \text{ of } 60\% \text{ of } 70\% = X \times (60/100) \times (70/100)$$

$$\text{And female voted} = y \text{ of } 70\% \text{ of } 60\% = y \times (70/100) \times (60/100)$$

$$\text{Total citizen} = x + y$$

$$\begin{aligned} \text{total citizen voted} &= X \times (60/100) \times (70/100) + y \times (70/100) \times (60/100) \\ &= X \times (6/10) \times (7/10) + y \times (7/10) \times (6/10) \\ &= (x+y)(6 \times 7)/100 \end{aligned}$$

$$\begin{aligned} \text{So, fraction of the citizen voted} &= \frac{(x+y) \times \frac{(6 \times 7)}{100}}{(x+y)} \\ &= 21/50 \end{aligned}$$

Ans: 21/50

4. A father has divided his property between his two sons A and B. A invests the amount at a compound profit of 8%. B invests the amount of 10% simple profit. At the end of 2 years, the profit received by B is 1336 taka more than A. Find the amount of both. Total amount of his father is Tk. 25000. (MTO 15)

Solution:

Let, share of A = x Tk

Share of B = (25000 - x) Tk

$$\begin{aligned} \text{A's profit} &= x \times (1 + 8\%)^2 - x \\ &= x \times (1 + 8/100)^2 - x \\ &= 0.1664x \end{aligned}$$

$$\begin{aligned} \text{B's profit} &= (25000 - x) \times 2 \times 10\% \\ &= (25000 - x) \times 0.2 \\ &= 5000 - 0.2x \end{aligned}$$

According to the question,

$$5000 - 0.2x - 0.1664x = 1336$$

$$\text{Or, } 5000 - 1336 = 0.2x + 0.1664x$$

$$\text{Or, } 0.3664x = 3664$$

$$\therefore x = 10000$$

So, Share of A = 10,000 Tk and share of B = 25,000 - 10,000 = 15,000 Tk

Ans: 10,000 Tk and 15,000 Tk

9. Bank Asia

1. A Dishonest merchant makes a 10% profit at the time of Buying and a 5% loss at the time of selling the goods he/she trades. By doing so it the said merchant made a profit of TK. 900 on a particular item, what was the real cost of item sold? (PO 15)

Solution:

Let, real cost= Tk. 100, buying cost= Tk. x

At the 1st case profit=10 of $x = x/10$

Then 2nd case loss=5 % of $x = x/20$

Now,

$$x/10 - x/20 = 900$$

$$\text{Or, } x/20 = 900$$

$$\therefore x = 18000$$

So, buying price= Tk. 18000

If buying cost is Tk. 90 then real cost Tk. 100.

If buying cost Tk. 18000 then real cost = $(100/90) \times 18000 = \text{Tk. } 20,000$

Ans: Tk. 20,000.

Alternative Method:

Let, the real cost = Tk. 100.

The showing price = $(100 + 10) = \text{Tk. } 110$.

loss = 5% of 110 = Tk. 5.5.

Then ultimate profit = $(10 - 5.5) = \text{Tk. } 4.5$.

When profit Tk. 4.5, real cost = Tk. 100.

When profit Tk. 900, real cost = $(100/4.5) \times 900 = \text{Tk. } 20000$

Ans: Tk. 20,000.

Alternative Method:

Let, Buying Price = Tk. $100x$.

At 10% profit = $100x \times (1.10) = 110x$.

At 5% Loss, selling price = $110x \times 0.95 = 104.5x$

So, total Profit = $104.5x - 100x = 4.5x$.

According to the question,

$$4.5x = 900$$

$$\therefore 100x = (900/4.5) \times 100x \\ = 20,000 \text{ Tk}$$

$$\therefore \text{Buying Price} = \text{Tk. } 20,000.$$

Ans: Tk. 20,000.

2. What will be the deposited amount at initial stage, if it becomes Tk. 43750 at the end of 5 year with a simple interest rate of 15% per annum? How many years it will take said deposited amount to become Tk. 55000? (PO 15)

Solution:

Let, Principal = P

We know,

$$I = A - P = Pnr$$

$$\text{Or, } 43750 - P = P \times 5 \times 15\%$$

$$\text{Or, } 43750 = P + 0.75P$$

$$\text{Or, } 1.75P = 43750$$

$$\therefore P = 25000$$

Deposited amount = Tk. 25,000.

Here, $P = 25000$, $A = 55000$, $r = 15\%$ and $n = ?$

Again,

$$A - P = Pnr$$

$$\text{Or, } 55,000 - 25,000 = 25,000 \times n \times 15\%$$

$$\text{Or, } 30,000 = 3750n$$

$$\therefore n = 8 \text{ years}$$

Time = 8 Years.

Ans: Tk. 25000 and 8 years

10. Bangladesh Shomobay Bank

1. Three partners shared the profit in a business in the ratio 5 : 7 : 8. They had partnered for 14 months, 8 months and 7 months respectively. What was the ratio of their investments? (O 15)

Solution:

Let, their investments be Tk. a for 14 months, Tk. b for 8 months and Tk. c for 7 months respectively.

Ratio of profit=5:7:8

So, $14a:8b:7c=5:7:8$

Now,

$$\frac{14a}{8b} = \frac{5}{7}$$

$$\text{Or, } 40b=98a$$

$$\therefore b = \frac{49a}{20}$$

and,

$$\frac{14a}{7c} = \frac{5}{8}$$

$$\text{Or, } \frac{2a}{c} = \frac{5}{8}$$

$$\text{Or, } 5c=16a$$

$$\therefore c = \frac{16a}{5}$$

$$\begin{aligned} a:b:c &= a: \frac{49a}{20}: \frac{16a}{5} \\ &= 20a : 49a : 16a \\ &= 20:49:64 \text{ (Ans.)} \end{aligned}$$

2. Mr. Rahman gave 40% of the money he had to his wife. He also gave 20% of the remaining amount to each of his three sons. Half of the amount now left was spent on miscellaneous items and the remaining amount of taka 12000 was deposited in the bank. How much money did Mr. Rahman have initially? (O 15)

Solution:

Let, the initial amount be x Tk.

After 40% giving wife,

$$\begin{aligned} \therefore \text{Remaining amount} &= x - 40\% \text{ of } x \text{ Tk.} \\ &= x - 0.40x \text{ Tk} \\ &= 0.60x \text{ Tk} \end{aligned}$$

After giving three sons, each 20% of 0.60x Tk.

$$\begin{aligned} \therefore \text{Remaining amount} &= 0.60x - 3(20\% \text{ of } 0.60x) \text{ Tk.} \\ &= 0.60x - 3 \times 0.12x \text{ Tk.} \\ &= 0.24x \text{ Tk.} \end{aligned}$$

$$\therefore \text{Spent on miscellaneous item} = \frac{1}{2} \text{ of } 0.24x \text{ Tk.} = 0.12x$$

According to the question,

$$0.12x = 12000 \text{ Tk.}$$

$$\text{Or, } x = 12000/0.12 \text{ Tk.}$$

$$\therefore x = 100,000 \text{ Tk.}$$

$$\therefore \text{Initial amount} = \text{Tk. } 100,000. \text{ (Ans.)}$$

11. NRB Bank

1. A certain sum of money is Tk.900 (including principal) in 5 years and Tk.1200 (including principal) in 8 years. What's the rate of simple interest? (MTO 16)

Solution:

In 8 years, Principal amount + Interest= 1200 Tk.

In 5 years, Principal amount + Interest= 900 Tk.

[By Subtracting] In 3 years interest= 300 Tk.

∴ In 1 year interest=Tk. 300/3= Tk. 100

∴ In 8 years interest = Tk. (100×8) = Tk. 800

So, Principal amount= Tk. (1200-800) = Tk. 400

In 1 year,

Tk. 400 gives interest Tk. 100

Tk. 1 " " Tk. 100/400

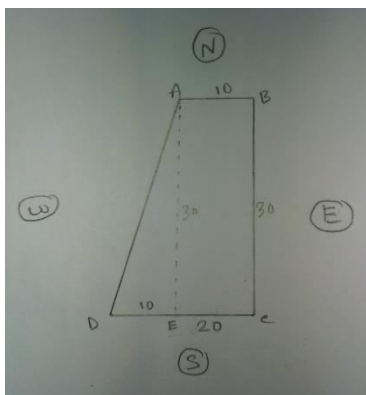
Tk. 100 " " Tk. $\frac{100 \times 100}{400}$
= Tk. 25

∴ Interest rate 25%.

Ans: 25%

2. A is 10 miles west to B, B is 30 miles north to C, C is 20 miles east to D. What's the distance from A to D? (MTO 16)

Solution:



According to the Pythagoras theorem,

$$AD^2 = DE^2 + AE^2$$

$$\text{Or, } AD = 10^2 + 30^2$$

$$\text{Or, } AD^2 = 1000$$

$$\text{Or, } AD = \sqrt{1000}$$

$$\therefore AD = 10\sqrt{10} \text{ (Ans.)}$$

12. South East Bank

1. A person invests Tk. 24000 at 7.5% interest annually. How much additional money needs to invest at 10% interest to earn overall interest at 9.25% on entire amount? (TO 16)

Solution:

Let, additional amount be Tk. x

According to the question,

$$7.5\% \text{ of } 24,000 + 10\% \text{ of } x = 9.25\% \text{ of } (24,000 + x)$$

$$\text{Or, } \frac{7.5}{100} \times 24,000 + \frac{10}{100} \times x = \frac{9.25}{100} \times (24,000 + x)$$

$$\text{Or, } 7.5 \times 24,000 + 10x = 9.25(24,000 + x)$$

$$\text{Or, } 180,000 + 10x = 222,000 + 9.25x$$

$$\text{Or, } 10x - 9.25x = 222,000 - 180,000$$

$$\text{Or, } 0.75x = 42,000$$

$$\text{Or, } x = 42,000 / 0.75$$

$$\therefore x = 56,000$$

$$\therefore \text{Additional amount is Tk. 56,000. (Ans.)}$$

Alternative Method:

Let, the total amount be Tk. x.

So, additional amount= Tk. (x-24,000)

According to the question,

$$10\% \text{ of } (x-24,000) + 7.5\% \text{ of } 24000 = 9.25\% \text{ of } x$$

$$\text{Or, } \frac{10(x-24,000)}{100} + \frac{7.5 \times 24000}{100} = \frac{9.25x}{100}$$

$$\text{Or, } 10(x-24,000) + 7.5 \times 24000 = 9.25x$$

$$\text{Or, } 10x - 240,000 + 180,000 = 9.25x$$

$$\text{Or, } 10x - 9.25x = 240,000 - 180,000$$

$$\text{Or, } 0.75x = 60,000$$

$$\text{Or, } x = 60,000 / 0.75$$

$$\therefore x = 80,000$$

$$\therefore \text{Additional amount} = \text{Tk. } (80,000 - 24,000) \\ = \text{Tk. } 56,000 \text{ (Ans.)}$$

2. If 7% of selling price is equal to 8% of cost price and 9% of selling price is 1 greater than 10% of cost price. What is cost price and how much money is earned by selling the product? (TO 16)

Solution:

Let, the cost price be Tk. A and selling price be Tk. B

According to the question,

$$7\% \text{ of } B = 8\% \text{ of } A$$

$$\text{Or, } 7B/100 = 8A/100$$

$$\text{Or, } 7B = 8A$$

$$\therefore B = 8A/7$$

And,

$$9\% \text{ of } B - 10\% \text{ of } A = 1$$

$$\text{Or, } 9B/100 - 10A/100 = 1$$

$$\text{Or, } 9B - 10A = 100$$

$$\text{Or, } 9 \times \frac{8A}{7} - 10A = 100$$

$$\text{Or, } \frac{72A - 70A}{7} = 100$$

$$\text{Or, } 2A = 700$$

$$\therefore A = 350$$

$$\therefore \text{Cost price} = \text{Tk. } 350$$

$$\therefore \text{Selling price} = \text{Tk. } \left(\frac{8}{7} \times 350\right) = \text{Tk. } 400$$

$$\therefore \text{Profit} = \text{Tk. } (400 - 350) \\ = \text{Tk. } 50 \text{ (Ans.)}$$

3. A man's income from interest and wages is Tk 500. He doubles his investment and also gets increase of 50% in wages and his income increases to Tk 800. What was his original income separately in terms of interest wages? (PO 16)

Solution:

Let, original income from Interest= Tk. I and wage= Tk. W

According to the question,

$$I + W = 500 \dots (i)$$

$$2I + 1.5W = 800 \dots (ii)$$

Now,

$$2 \times (i) - (ii) \Rightarrow$$

$$0.5W = 200$$

$$\therefore W = 400$$

$$\text{Wage} = \text{Tk. } 400 \text{ and Interest} = \text{Tk. } (500 - 100) = \text{Tk. } 400$$

$$\therefore \text{Ans: Tk. } 400 \text{ and Tk. } 100.$$

Alternative Method:

Let, Income from interest be Tk x and wages be Tk (500-x)

According to the question,

$$2x + 1.5(500 - x) = 800$$

$$\text{Or, } 2x + 750 - 1.5x = 800$$

$$\text{Or, } 0.5x = 50$$

$$\therefore x = 100$$

$$\text{So, Interest Income is TK } 100 \text{ and Wages income is TK. } (500 - 100) = \text{TK. } 400$$

$$\therefore \text{Ans: Tk. } 400 \text{ and Tk. } 100.$$

4. A book and a pen were sold for Tk. 3040 making a profit of 25% on the book and 10% on the pen. By selling them for Tk. 3070, the profit realized would have been 10% on the book and 25% on the pen. Find the cost of each. (PO 16)

Solution:

Let, the cost price of pen be P and book be B.

According to the question,

$$125\% \text{ of } B + 110\% \text{ of } P = 3040$$

$$\text{Or, } 125B + 110P = 304000$$

$$\therefore 25B + 22P = 60800 \dots\dots (i)$$

And,

$$110\% \text{ of } B + 125\% \text{ of } P = 3070$$

$$\text{Or, } 110B + 125P = 307000$$

$$\therefore 22B + 25P = 61400 \dots\dots (ii)$$

Now,

$$(i) \times 25 - (ii) \times 22 \Rightarrow$$

$$625B + 550P = 1520000$$

$$484P + 550P = 1350800$$

$$141P = 169200$$

$$\therefore P = 1200$$

Putting the value of P in (i) we get

$$22B + 25 \times 1200 = 60800$$

$$\text{Or, } 22B = 60800 - 30000$$

$$\text{Or, } B = 30800/22$$

$$\therefore B = 1400$$

\therefore The cost price of pen Tk. 1200 and book Tk. 1400. (Ans.)

13. House Building Finance Corporation

1. If 5 is added to the sum of two digits of a number consisting of two digits, the sum will be three times the digits of the tens place. Moreover, if the places of the digits are interchanged, the number thus found will be 9 less than the original number. Find the number. (SO 15)

Solution:

Let, ten's digit = x

& unit's digit = y

The number be $10x + y$.

According to the question,

$$x + y + 5 = 3x,$$

$$\therefore y = 2x - 5 \dots\dots (1)$$

and,

$$10y + x = 10x + y - 9,$$

$$\text{Or, } 9y = 9x - 9,$$

$$\text{Or, } y = x - 1,$$

$$\text{Or, } 2x - 5 = x - 1 \text{ [from (1)],}$$

$$\therefore x = 4,$$

$$\text{and } y = 4 - 1 = 3.$$

The number is $= 10 \times 4 + 3 = 43$ (Ans.)

2. In a certain store, the profit is 320% of the cost. If the cost increases by 25% but the selling price remains constant, approximately what percentage of the selling price is the profit now? (SO 15)

Solution:

Let, cost price = 100 & Profit = 320.

$$\text{Selling price} = 100 + 320 = 420.$$

Now Cost = 125.

Selling price remained constant.

$$\text{So, Profit becomes} = (420 - 125) = 295.$$

$$\therefore \text{Profit percentage on Selling Price} = (295 \times 100) / 420 \% \\ = 70.23\% \text{ (Ans)}$$

14. Modhumoti Bank

1. Abir can do a piece of work in 80 days. He works for 10 days and then Basher alone finishes the rest of the work in 42 days. How much time would it take for the two of them together to complete the whole work? (MTO 16)

Solution:

Let, the whole work = 1 part

In 80 days, Abir can do 1 work

∴ In 1 day,.....(1/80) portion

∴ In 10 days.....(1×10)/80 portion
=1/8 portion

∴ Rest of the work = 1-(1/8)= 7/8 portion

Now,

In 42 days, Bashir can do 7/8 portion

∴ In 1 day, Bashir can do (7/8)×42 portion
=1/48 portion

In 1 day, Abir and Bashir together can do = (1/80+1/48) portion
= (3+5)/240
= 1/ 30 portion

So, they can do 1/30 part works in 1 day

∴ They can do 1 part works in 30/1= 30 days. (Ans.)

2. A man has to go 10 km to catch a bus. He walks part of the way at 7 km per hour runs the rest of the way at 12 km per hour. If he takes 1 hour 15 minutes to complete his journey. Find how far he walked? (MTO 16)

Solution:

Let, he walks 'x' km and run (10-x) km.

According to the question,

$$\frac{x}{7} + \frac{10-x}{12} = \frac{75}{60}$$

$$\text{Or, } \frac{12x+7(10-x)}{84} = \frac{5}{4}$$

$$\text{Or, } \frac{12x+70-7x}{84} = \frac{5}{4}$$

$$\text{Or, } \frac{5x+70}{84} = \frac{5}{4}$$

$$\text{Or, } 20x + 280 = 420$$

$$\text{Or, } 20x = 420 - 280$$

$$\text{Or, } 20x = 140$$

$$\therefore x = 7$$

∴ He walked 7 km. (Ans.)

3. In a school, there are equal number of boys and girls. Among the students, 1/8 of the girls and 5/6 of the boys are residing in the hostel. What percent of the Students consists of boys who do not reside in the hostel among all students? (MTO 16)

Solution:

Let, the number of boys be 'x' and girls be 'x'.

∴ Total= 2x students.

Non residing boys= x-5/6 of x= x- 5x/6=x/6

$$\therefore \text{Required percentage} = \frac{\frac{x}{6}}{2x} \times 100\% \\ = 8.33\% \text{ (Ans.)}$$

Alternative Method:

L.C.M. of 8 and 6= 48

Let, total student be 48

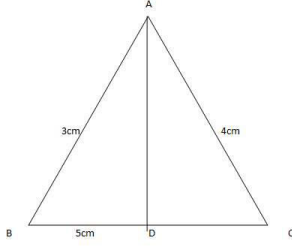
So, boys= 24 and girls= 24

Boys residing in the hostel =24×(5/6)= 20

Boys do not reside in the hostel =24-20= 4

$$\therefore \text{Required percentage} = \frac{4}{48} \times 100\% \\ = 8.33\% \text{ (Ans.)}$$

4. ABC is a triangle in which AB = 3cm, BC = 5cm, and AC = 4cm, AD is perpendicular from A to BC. Find the length of AD. (MTO 16)



Solution:

$$\text{Perimeter} = 3 + 4 + 5 = 12,$$

$$\text{Half perimeter, } s = 12/2 = 6$$

$$\begin{aligned} \therefore \text{Area} &= \sqrt{s(s-a)(s-b)(s-c)} \\ &= \sqrt{6(6-3)(6-4)(6-5)} \\ &= \sqrt{36} \\ &= 6 \end{aligned}$$

Again,

$$\text{Area} = \frac{1}{2} \times AD \times BC$$

$$6 = \frac{1}{2} \times AD \times 5$$

$$\therefore AD = 2.4 \text{ cm (Ans.)}$$

5. If $x + y = a$, $x^2 + y^2 = b^2$ and $x^3 + y^3 = c^3$, then show that $a^3 + 2c^3 = 3ab^2$. (MTO 16)

Solution:

$$\text{L.H.S.} = a^3 + 2c^3$$

$$= (x + y)^3 + 2(x^3 + y^3)$$

$$= x^3 + y^3 + 3x^2y + 3xy^2 + 2x^3 + 2y^3$$

$$= 3x^3 + 3y^3 + 3x^2y + 3xy^2$$

$$= 3(x^3 + y^3 + x^2y + xy^2)$$

$$= 3(x^3 + x^2y + xy^2 + y^3)$$

$$= 3\{x^2(x + y) + y^2(x + y)\}$$

$$= 3(x + y)(x^2 + y^2)$$

$$= 3ab^2 = \text{R.H.S.}$$

$$\therefore a^3 + 2c^3 = 3ab^2 \text{ (Showed)}$$

১৫. জীবন বিমা

১। দুইটি ট্রেন ঘন্টায় ৩০ কি.মি এবং ৬০ কি.মি বেগে একে অপরের বিপরীতে অতিক্রম করল। একটি ট্রেন এর দৈর্ঘ্য ১.১৫ কি.মি এবং অপর ট্রেন এর দৈর্ঘ্য ০.৬৫ কি.মি.। ধীর গতির ট্রেনটি দ্রুত গতির ট্রেন টিকে অতিক্রম করতে কত সেকেন্ড সময় লাগবে? (AM-15)

সমাধান:

$$\text{প্রকৃত গতিবেগ} = (৩০ + ৬০) \text{ কি মি / ঘ}$$

$$= ৯০ \text{ কি মি / ঘন্টা}$$

$$= \frac{৯০ \times ১০০০}{৬০০} \text{ মিটার / সেকেন্ড}$$

$$= ১৫০ \text{ মি / সে}$$

$$\therefore \text{মোট দূরত্ব} = (১.১৫ + ০.৬৫) \text{ কি মি}$$

$$= ১.৮০ \text{ কি মি}$$

$$= ১৮০০ \text{ মি [১ কিমি = ১০০০ মি]}$$

$$\text{সুতরাং সময় লাগবে} = ১৮০০ / ১৫ = ৭২ \text{ সেকেন্ড}$$

$$\text{উত্তর: ৭২ সেকেন্ড}$$

২। আবুল এর বেতন সাপ্তাহিক ১৬% বাড়লে মাসিক বেতন ৮১২ হত। তার সাপ্তাহিক বেতন ১০% বাড়লে তার মাসিক বেতন কত হবে? (AM-15)

সমাধানঃ

মনেকরি,

সাপ্তাহিক বেতন = ক টাকা

১৬% বৃদ্ধিতে সাপ্তাহিক বেতন = ক+ক এর ১৬%

$$= ক+১৬ক/১০০$$

$$= ক+৮ক/২৫$$

$$= ২৯ক/২৫ টাকা$$

১মাস = ৪ সপ্তাহ

∴ মাসিক বেতন = (২৯ক/২৫) × ৪

প্রশ্নমতে,

$$(২৯ক/২৫) × ৪ = ৮১২$$

$$\text{বা, ক} = \frac{৮১২ \times ২৫}{২৯ \times ৪}$$

$$\therefore ক = ১৭৫$$

১০% বৃদ্ধিতে সাপ্তাহিক বেতন = ক+ক এর ১০%

$$= ক+ক/১০$$

$$= ১১ক/১০$$

∴ মাসিক বেতন = (১১ক/১০) × ৪

$$= \frac{১১ \times ১৭৫}{১০} \times ৪$$

$$= ৭৭০ টাকা$$

উত্তর: ৭৭০ টাকা

16. Meghna Bank

1. A, B and C enter into a partnership. A initially invests Tk. 25 lakhs and adds another Tk. 10 lakhs after one year. B initially invests Tk. 35 lakhs and withdraws Tk. 10 lakhs after 2 years and C invests Tk. 30 lakhs. In what ratio should the profits be divided at the end of 3 years? (MTO 16)

Solution:

The profit should be divided according to the investment ratios

$$A: B: C = (25 \times 1 + 35 \times 2) : (35 \times 2 + 25 \times 1) : (30 \times 3)$$

$$= (25 + 70) : (70 + 25) : (90)$$

$$= 95 : 95 : 90$$

$$= 19 : 19 : 18$$

Ans: 19: 19 : 18

2. If the rate increases by 2%, the simple interest received on a sum of money increases by Tk. 108. If the time period is increased by 2 years, the simple interest on the same sum increases by Tk. 180. The sum is (MTO 16)

Ans: Data inadequate

17. Dhaka Bank

1.The annual average income of a & b is 38000 Tk, b and c is 48000 Tk and c & a is 58000 Tk. Find the average income of a, b and c. (TCO 16)

Solution:

Given that,

$$\frac{a+b}{2} = 38000$$

$$\therefore a+b = 76,000$$

$$\frac{b+c}{2} = 48000$$

$$\therefore a+b = 96,000$$

$$\frac{c+a}{2} = 58000$$

$$\therefore a+b = 116,000$$

Now,

$$a+b+b+c+c+a = 76,000 + 96,000 + 116,000$$

$$\text{Or, } 2(a+b+c) = 288000$$

$$\text{Or, } a+b+c = 144000$$

$$\therefore \frac{a+b+c}{3} = 48,000 \text{ (Ans.)}$$

2.The sum of two numbers 13 and their product 30. Find the sum of their square. (TCO 16)

Solution:

Given that,

$$x+y=13 \text{ and } xy=30$$

We know,

$$\begin{aligned} x^2 + y^2 &= (x+y)^2 - 2xy \\ &= (13)^2 - 2 \times 30 \\ &= 109 \text{ (Ans.)} \end{aligned}$$

BCS Bank

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